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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
			EXAMINER KESSLER, CHRISTOPHER S	
			ART UNIT 1793	PAPER NUMBER
			NOTIFICATION DATE 12/14/2007	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	Application No. 10/615,939	Applicant(s) KONDOH ET AL.	
	Examiner Christopher Kessler	Art Unit 1793	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 October 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 3, 4, 6-17, 19-23, 25-26, 29, 36 and 38-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6-17,19-23,25,26,29,36 and 38-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 17 October 2007 has been entered.

### ***Status of Claims***

2. Responsive to the amendment filed 17 October 2007, claims 1 and 36 are amended, claim 37 is cancelled, and new claims 39-41 are added. Claims 1, 3, 4, 6-17, 19-23, 25-26, 29, 36 and 38-41 are currently under examination.

### ***Status of Previous Rejections***

3. The amendments to independent claims 1 and 36 require new grounds for rejection, stated below.

### ***Claim Rejections - 35 USC § 103***

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1, 7, 19, 20, 22, 26, 29, 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '901 in view of U.S. Patent 6,664,018 issued to Chen et al. (hereinafter "Chen").

Regarding claim 1, JP '901 teaches the invention substantially as claimed. JP '901 discloses a method of preparing a green compact by coating a die with lubricant (see claim 1). JP '901 also teaches that the lubricant is selected from a list comprising zinc stearate lubricants, made by dispersing a solid lubricant in a solvent (see paragraph [0016], for example). JP '901 further discloses wherein this coating may be accomplished by means of spray coating (see paragraph [0016]). The claimed limitation of the lubricant being applied uniformly onto the inner surface of the die is not specifically disclosed, but would be inherent in the prior art process of spray coating (see MPEP §2112). JP '901 further teaches that the die is heated to 150-400 °C (see paragraph [0017]). JP '901 teaches filling a raw material powder whose major component is an active metallic element into the die (see paragraphs [0008-0009], for example). JP '901 teaches compacting the raw material by warm pressurizing to make a green compact (see paragraph [0008], for example). The examiner notes that the process step of ejecting the green compact from the die is inherent in the process for compacting a green compact (see MPEP §2112.01). JP '901 teaches wherein the green compact has high density (see paragraph [0006], for example), and wherein the active metallic element is aluminum (see paragraph [0009], for example). JP '901 does not disclose wherein a new metallic soap film comprising the active metallic element is

formed on a surface of the green compact, however, this property would be inherent in the process disclosed in JP '901 (see MPEP §2112).

JP '901 does not teach wherein the dispersion comprises a surfactant which is different from the lubricant. However, it is well known in the art of dispersion that surfactants are commonly added to improve the stability.

For example, Chen teaches a method for forming a dispersion of zinc stearate in water (see Abstract, cols. 2-3). Chen teaches that prior art methods of mixing zinc stearate with a surfactant and water do not yield dispersions with long-term stability (see cols. 1). Chen teaches that the dispersion comprises a surfactant (see cols. 3-7). Chen teaches that the particles of zinc stearate in the dispersion are submicron (see col. 3), meeting the limitation of being powdery.

It would have been obvious to one of ordinary skill in the art at time of invention to have practiced the invention of JP '901, and to have replaced the zinc stearate dispersion with the zinc stearate dispersion made by the method of Chen, because Chen teaches that the method can create a very stable dispersion while using less energy (see cols. 3-4).

Regarding claim 7, JP '901 is applied to the reference as stated above in the rejection of claim 1.

Regarding claim 19, JP '901 teaches a dispersion based on water or alcohol (see paragraph [0016]).

Regarding claim 20, JP '901 does not teach a dispersion of water mixed with an alcohol-based solvent in an amount of from 1 to 50% by volume. However, JP '901

does teach that either water or alcohol may be used for the same utility. It would have been obvious to one of ordinary skill in the art at time invention was made to mix the two solvents with identical utility, to create a solvent with the same utility (see MPEP §2144.06)

Regarding claim 22, JP '901 is applied to the claim as stated above in the rejection of claim 1.

Regarding claim 26, the claimed properties not disclosed in the prior art process would be inherent in that process (see MPEP §2112).

Regarding claim 29, JP '901 is applied to the claim as stated above. JP '901 further teaches sintering of the green body (see paragraph [0026]).

Regarding claim 38, JP '901 is applied to the claim as stated above in the rejection of claim 1. The claimed limitation of the soap film formed being uniform is not specifically disclosed, but would be inherent in the prior art process (see MPEP §2112).

Regarding claims 39 and 40, JP '901 teaches to use zinc stearate (see paragraph [0016], for example).

Regarding claim 41, Chen teaches that the surfactant may be selected from a list including anionic surfactants such as polyoxyethylene nonylphenyl ether (see col. 4).

6. Claims 14, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '901 in view of Chen as applied to claim 1 above, and further in view of Kondo '760.

Regarding claim 14, JP '901 is applied to the claim as stated above. JP '901 is silent with regard to an ejection pressure of 10 MPa or less when the compacting pressure is 784 MPa or more.

Kondo '760 teaches a process for compacting a green compact comprising spraying a powdery higher fatty acid-based lubricant which is dispersed in a dispersion comprising a surfactant onto an inner surface of a die, which is heated (see claim 1, and figure 1, for example); filling a raw material powder whose major component is an active metallic element into the die (see claim 1); compacting the raw material powder by warm pressurizing to make a green compact (see claim 1); and ejecting the green compact from the die (see abstract, for example); whereby the resulting green compact has a high density (see abstract).

Kondo '760 teaches that ejection pressure is 10 MPa or less when the compacting pressure is 784 MPa or more (see figure 4). Kondo '760 further teaches that the ratio of ejecting pressure with respect to compacting pressure shows a decreasing trend with increasing compacting pressure (see col. 20, lines 15-53, for example).

It would have been obvious to one of ordinary skill in the art at time invention was made to use the high pressures taught by Kondo '760 (cited above) in the process of JP '901, in order to improve density in the green compact and decrease the ejection force, as taught by Kondo '760 (cited above).

Regarding claim 16, JP '901 is applied to the claim as stated above. As stated above, it would have been obvious to one of ordinary skill in the art to use 392 MPa

compacting pressure or more as taught by Kondo '760 in the process of JP '901, in order to improve density in the green compact and decrease the ejection force, as taught by Kondo '760 (cited above). The properties not disclosed in the prior art of ejecting pressure being less than 5 MPa would be inherent in the process (see MPEP§2112.01).

Regrading claim 17, JP '901 is applied to the claim as stated above. Kondo '760 teaches that the ratio of ejecting pressure with respect to compacting pressure shows a decreasing trend with increasing compacting pressure (see col. 20, lines 15-53, for example).

7. Claims 3, 6, 10, 11, 13, 17 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '901 in view Chen as applied to claim 1 above, further in view of Kobayashi.

Regarding claim 3 and claim 6, JP '901 is applied to the claim as stated above. JP '901 does not disclose any specific alloying elements to be added to the raw material powder.

Kobayashi teaches a process for manufacturing sintered compacts of aluminum-base alloys in which the inside surface of the die is coated by a lubricant (see col. 4, line 63-col. 5, line 6). Kobayashi further teaches that the alloys may be made from alloy powders comprising silicon, copper, and magnesium (see col. 3, line 10-col. 4, line 62). It would have been obvious to one of ordinary skill in the art at time of invention to use the raw material powder comprising silicon, taught by Kobayashi, cited above, in order



to obtain an alloy with age hardening effects, as taught by Kobayashi (see col. 2, lines 5-23).

Regarding claim 10, JP '901 is applied to the claim as stated above. JP '901 does not teach apparent green density of the compact is 90% or more.

Kobayashi further discloses that the green density of the compact made from aluminum, silicon, copper, and magnesium is preferably 90-99% (see col. 5, lines 7-18).

Regarding claim 11, JP '901 is applied to the claim as stated above. JP '901 does not disclose any specific compacting pressure for aluminum of 392 MPa or more.

Kobayashi teaches that the compaction is performed at pressures of 3-4 ton/cm<sup>2</sup>, said pressure range overlapping the claimed range and thus establishing a *prima facie* case of obviousness for that range (see MPEP §2144.05). It would have been obvious to one of ordinary skill to select any part of the disclosed prior art range as the reference cited teaches the same utility over the entire range.

Regarding claim 13, JP '901 is applied to the claim as stated above. JP '901 does not disclose compacting pressure of 392-2,500 MPa.

Kobayashi teaches that the compaction is performed at pressures of 3-4 ton/cm<sup>2</sup>, said pressure range overlapping the claimed range and thus establishing a *prima facie* case of obviousness for that range (see MPEP §2144.05). It would have been obvious to one of ordinary skill to select any part of the disclosed prior art range as the reference cited teaches the same utility over the entire range.

Regarding claim 17, neither JP '901 nor Kobayashi disclose wherein the ejection force with respect to the compacting pressure shows a decreasing tendency when the

compacting pressure increases. However, the ejection force of the pellet would be an inherent property in the process (see MPEP §2112).

Regarding claim 36, JP '901 is applied to the claim as stated in the rejection of claim 1 above. JP '901 does not teach wherein the apparent density of the green compact is 90% or more. Kobayashi further discloses that the green density of the compact made from aluminum, silicon, copper, and magnesium is preferably 90-99% (see col. 5, lines 7-18).

8. Claims 1, 3, 4, 6, 7, 17, 19, 29, and 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '206 in view of Chen and JP '901.

Regarding claim 1, JP'206 discloses the invention substantially as claimed. JP '206 teaches a process for compacting a green compact comprising coating a solution of Zn stearate onto a die, filling a raw material powder whose major component is Ti into the die, compacting the material powder to make a green compact (see abstract). JP '206 does not disclose ejecting the green compact from the die, wherein the lubricant is sprayed, wherein the die is heated, wherein the raw material is compacted by warm pressurizing, or wherein a new metallic soap film is formed on the green surface of the compact. Ejecting the green compact from the die is well known in the art as an integral part of a process for compacting a green compact, and it would have been obvious to one of ordinary skill in the art to eject the green compact from the die, in order to proceed with a sintering procedure, for example. The claimed limitation of the lubricant

being applied uniformly onto the inner surface of the die is not specifically disclosed, but would be inherent in the prior art process of spray coating (see MPEP §2112).

JP '901 discloses a method of preparing a green compact by coating a die with lubricant (see claim 1). JP '901 also teaches that the lubricant is selected from a list comprising zinc stearate lubricants, made by dispersing a solid lubricant in a solvent (see paragraph [0016], for example). JP '901 further discloses wherein this coating may be accomplished by means of spray coating (see paragraph [0016]). JP '901 further teaches that the die is heated to 150-400 °C (see paragraph [0017]). JP '901 teaches filling a raw material powder whose major component is an active metallic element into the die (see paragraphs [0008-0009], for example). JP '901 teaches compacting the raw material by warm pressurizing to make a green compact (see paragraph [0008], for example). The examiner notes that the process step of ejecting the green compact from the die is inherent in the process for compacting a green compact (see MPEP §2112). JP '901 teaches wherein the green compact has high density (see paragraph [0006], for example), and wherein the active metallic element is aluminum (see paragraph [0009], for example). JP '901 does not disclose wherein a new metallic soap film comprising the active metallic element is formed on a surface of the green compact, however, this property would be inherent in the process disclosed in JP '901 (see MPEP §2112).

It would have been obvious to use the compaction process comprising warm pressurizing disclosed in JP '901 in the invention of JP '206 in order to improve the

density and green strength of the green compact, as taught by JP '901 (see paragraph [0006]).

JP '901 does not teach wherein the dispersion comprises a surfactant which is different from the lubricant. However, it is well known in the art of dispersion that surfactants are commonly added to improve the stability.

For example, Chen teaches a method for forming a dispersion of zinc stearate in water (see Abstract, cols. 2-3). Chen teaches that prior art methods of mixing zinc stearate with a surfactant and water do not yield dispersions with long-term stability (see cols. 1). Chen teaches that the dispersion comprises a surfactant (see cols. 3-7). Chen teaches that the particles of zinc stearate in the dispersion are submicron (see col. 3), meeting the limitation of being powdery.

It would have been obvious to one of ordinary skill in the art at time of invention to have practiced the invention of JP '901, and to have replaced the zinc stearate dispersion with the zinc stearate dispersion made by the method of Chen, because Chen teaches that the method can create a very stable dispersion while using less energy (see cols. 3-4).

Regarding claim 3, JP '206 teaches that the raw material powder comprises iron (see abstract).

Regarding claim 4, JP '206 teaches wherein the raw material powder is Ti powder (see abstract).

Regarding claim 6, JP '206 further teaches wherein the raw material powder comprises iron (see abstract).

Regarding claim 7, JP '206 teaches wherein the raw powder comprises Al powder (see abstract).

Regarding claim 17, neither JP '206 nor JP '901 disclose wherein the ejection force with respect to the compacting pressure shows a decreasing tendency when the compacting pressure increases. However, the ejection force of the pellet would be an inherent property in the process (see MPEP §2112).

Regarding claim 19, JP '206 does not teach wherein the solvent is selected from the group consisting of water and alcohol based solvents. JP '901 teaches a dispersion based on water or alcohol (see paragraph [0016]).

Regarding claim 29, JP '206 is applied to the claim as stated above. JP '901 further teaches sintering of the green body (see paragraph [0026]).

Regarding claim 38, JP '206 and JP '901 are applied to the claim as stated above in the rejection of claim 1. The claimed limitation of the soap film formed being uniform is not specifically disclosed, but would be inherent in the prior art process (see MPEP §2112).

Regarding claims 39 and 40, JP '901 teaches to use zinc stearate (see paragraph [0016], for example).

Regarding claim 41, Chen teaches that the surfactant may be selected from a list including anionic surfactants such as polyoxyethylene nonylphenyl ether (see col. 4).

9. Claims 1, 3, 4, 6, 7, 8, 9, 11, 12, 14, 15, 17, 19, 21, 23, 25, 29, and 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo '760, in view of U.S. Patent 6,551,371 issued to Furuta et al. (hereinafter "Furuta").

Regarding claim 1, Kondo '760 teaches a process for compacting a green compact comprising spraying a powdery higher fatty acid-based lubricant which is dispersed in a dispersion comprising a surfactant onto an inner surface of a die, which is heated (see claim 1, and figure 1, for example); filling a raw material powder whose major component is an active metallic element into the die (see claim 1); compacting the raw material powder by warm pressurizing to make a green compact (see claim 1); and ejecting the green compact from the die (see abstract, for example); whereby the resulting green compact has a high density (see abstract).

Kondo '760 further teaches that a new metallic soap film being different from the higher fatty acid-based lubricant and comprising the active metallic element is formed on a surface of the green compact (see claim 1). Kondo '760 teaches that the lubricant is applied to the die uniformly (see fig. 3, for example).

Kondo does not disclose wherein the active metallic element is titanium or aluminum.

Furuta teaches that titanium based composites may be prepared by powder metallurgy in the same field of endeavor (see abstract). Furuta further teaches that the materials may be formed by using die compaction (see col. 14, lines 13-19). It would have been obvious to one of ordinary skill in the art at time the invention was made to

use the powder composition disclosed in Furuta (see col. 12, line 23-col. 14, line 12, for example), in order to make a composite suitable for application to a valve in an automobile engine, as taught by Furuta (see "Background Art").

Regarding claim 3, Furuta further teaches that the raw material powder comprises aluminum (see abstract).

Regarding claim 4, Furuta further teaches that the raw material powder comprises titanium alloy (see abstract).

Regarding claim 6, Furuta further teaches that the raw material powder comprises silicon (see abstract).

Regarding claim 7, Furuta further teaches that the raw material powder comprises compounds of aluminum (see abstract).

Regarding claim 8, Furuta further teaches that the raw material powder can comprise borides (see col. 13, lines 9-63).

Regarding claim 9, Furuta teaches that the green density of the compact is desirably

Regarding claim 11, Kondo '760 teaches that the die should be heated from 100 °C or more (see claim 5), said temperature range overlapping the range claimed by applicant, establishing a *prima facie* case of obviousness for that range (see MPEP §2144.05). It would have been obvious to one of ordinary skill to select any part of the disclosed prior art range as the reference cited teaches the same utility over the entire range of 100-225 °C. Kondo '760 teaches that the die is heated to a temperature of at least 100 °C, (see claim 5), and the powder compacted at a high pressure in order to

decrease the ejection force (see col. 2, lines 15-31), and that pressure is selected in order to force a higher fatty acid-based lubricant to bond with the metal powder (see col. 8, lines 28-43, for example). It would have been obvious to one of ordinary skill in the art at time of invention choose an compaction pressure over 392 MPa in order to cause a metallic soap film to form on the compact and reduce ejection force.

Regarding claim 12, Kondo '760 teaches that the die should be heated from 100 °C or more (see claim 5), said temperature range overlapping the range claimed by applicant, establishing a *prima facie* case of obviousness for that range (see MPEP §2144.05). It would have been obvious to one of ordinary skill to select any part of the disclosed prior art range as the reference cited teaches the same utility over the entire range of 100-225 °C. Kondo '760 teaches that the die is heated to a temperature of at least 100 °C, (see claim 5), and the powder compacted at a high pressure in order to decrease the ejection force (see col. 2, lines 15-31), and that pressure is selected in order to force a higher fatty acid-based lubricant to bond with the metal powder (see col. 8, lines 28-43, for example). It would have been obvious to one of ordinary skill in the art at time of invention choose an compaction pressure from 500-2500 MPa in order to cause a metallic soap film to form on the compact and reduce ejection force.

Regarding claim 14, Kondo '760 teaches that ejection pressure is 10 MPa or less when the compacting pressure is 784 MPa or more (see figure 4).

Regarding claim 15, Kondo '760 teaches that ejection pressure is 10 MPa or less when the compacting pressure is 784 MPa or more (see figure 4).



Regarding claim 17, Kondo teaches that the ratio of ejecting pressure with respect to compacting pressure shows a decreasing trend with increasing compacting pressure (see fig. 4).

Regarding claim 19, Kondo '760 teaches to use water as the solvent in the dispersion (see col. 5, line 5-col. 6, line 66).

Regarding claim 21, Kondo '760 teaches to heat to at least 100 °C, the boiling point of said water, and further teaches that it is preferable to heat to less than the melting temperature of the lubricant (see col. 7, lines 20-33).

Regarding claim 23, Kondo '760 teaches that the lubricant has particle diameter of 30  $\mu\text{m}$  or less (see col. 5, lines 10-27).

Regarding claim 25, Kondo '760 teaches that the metal powder forms a metallic soap film (see col. 4, line 33-col. 5, line 4).

Regarding claim 29, the references are applied to the claims as stated in the rejection of claim 1.

Regarding claim 38, Kondo '760 teaches that the new metallic soap film is uniform (see col. 7, lines 7-19, for example).

Regarding claims 39-40, Kondo '760 teaches that the lubricant is zinc stearate (see cols. 2-3, for example).

Regarding claim 41, Kondo '760 teaches that the surfactant may be a polyoxyethylene nonylphenyl ether (EO) 6 or a polyoxyethylene nonylphenyl ether (EO) 10 (see col. 5).

***Response to Arguments***

10. Applicant's arguments with respect to the rejections based on JP '901 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments with respect to the rejections based on Kondo '760 have been fully considered but they are not persuasive. Applicant has stated that US '371 does not provide a suggestion that Ti and Al could be successfully used in the invention of Kondo '760. The Examiner disagrees with this position, as US '371 teaches that aluminum and titanium are successfully compacted into green compacts.

***Conclusion***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Kessler whose telephone number is (571) 272-6510. The examiner can normally be reached on Mon-Fri, 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Application/Control Number:  
10/615,939  
Art Unit: 1793

Page 18

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csk

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